ABSTRACT OF THE DISCLOSURE

Systems and methods for removing toxic emissions from flue gas of coal fired combustion units can be achieved. Decreasing sulfur oxide emissions from a coal fired circulating fluidized bed reactor can include treating flue gas unit using a wet scrubber. Wet scrubbers can include gas phase scrubbers, liquid phase scrubbers, and gas-liquid phase scrubbers. Additionally, toxic emissions can be reduced from coal fired combustion units such as circulating fluidized beds or pulverized coal units. Particulates can be removed from flue gas of the coal fired combustion unit. The flue gas can then be treated with at least two consecutive wet scrubbers to produce a low sulfur flue gas. In addition to sulfur oxides, a wide variety of toxic emissions can be removed such as nitrogen oxides, carbon monoxide, arsenic, beryllium, cadmium, hydrochloric acid, chromium, cobalt, hafnium, lead, manganese, mercury, nickel, selenium, benzo(a)pyrene, and combinations thereof. Such systems and methods provide improved levels of toxic emissions over currently available technologies.